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FRUIT FLY CONTROL WITH POISONED-BAIT SPRAYS IN HAWAII

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A poisoned-bait spray containing malathion and a hydrolyzed or partially hydrolyzed protein will give control of the oriental fruit fly (Dacus dorsalis Hendel) for 1 to 3 weeks. The fruit flies are attracted to the deposits by the protein material, which contains nutrients essential for their sexual development, and quickly ingest enough to kill them. The contact action of the deposits and contamination of natural food sources also contribute to fly mortality.

In tests conducted in Hawaii this bait spray has given exceptionally good control of infestations in mangoes and guavas and of mixed infestations of this fly and the melon fly (D. cucurbitae Coq.) attacking passion fruit. It is very attractive and toxic to the melon fly, but its usefulness for protecting other crops damaged by this fly has not been fully determined. Limited tests have shown that it is also very attractive and toxic to the Mediterranean fruit fly (Ceratitis capitata (Weid.)).

Fruit flies generally concentrate on ripening or ripe fruits. The egg punctures provide easy entry for rots and reduce fruit grades by spoiling its appearance. The maggots feed on the flesh of the fruit and cause decay. Egg punctures in soft immature fruits cause them to fall to the ground or develop abnormally. Heavy attack by the melon fly and the oriental fruit fly in Hawaii often prevents passion fruit from setting a satisfactory crop.

These bait sprays have caused no injury to the fruit or foliage of passion fruit, mango, or guava, and are therefore recommended for the protection of these fruits from fruit flies. Tests conducted on a wide variety of crops on the mainland and elsewhere have shown that the phytotoxicity of malathion is very low. However, more information on their toxicity to tropical and subtropical plants is needed. The user should carefully observe all treated crops for signs of injury.

Control with bait sprays is most effective when large areas are treated. On areas of less than an acre there is greater danger from flies moving in from outside areas. It is particularly difficult to protect the fruit on single trees, but most of the egg laying can be prevented with a thorough application of bait spray containing double-strength yeast protein.

On large areas the bait spray can be applied either in concentrated or dilute form. On small areas a dilute spray is usually most convenient.

Preparation

Use one of the following formulas according to your equipment and the size of the area to be treated. Use the amount of water most suitable for your equipment. The quantities given for the large areas are sufficient to treat 1 acre.

Ingredient	Large areas		Small areas
	Concentrated spray	Dilute spray	
Water	3 to 40 gallons	40 to 150 gallons	5 gallons
Yeast protein	1 pound	1 pound	10 tablespoonfuls
Malathion, 25% wettable powder	2 pounds	3 pounds	15 tablespoonfuls

Dissolve the protein in the water and then add the malathion wettable powder. Do not use any other formulation. Apply the bait spray on the same day that it is prepared.

Malathion alone, without the attractant, is an effective fruit fly insecticide, but two or three times as much material and more frequent applications are necessary, and consequently a longer interval between the spray application and harvest.

Do not use sugar in the bait spray, as it may reduce its attractiveness to some fruit flies.

The cost of materials for this bait spray will be $4 per acre or less, depending on the type of protein that is used.

Application

Apply the bait spray every 2 weeks. In exceedingly dry weather the interval between sprays can be lengthened to 3 weeks; in rainy weather it may be necessary to shorten it to 10 days or 1 week.

The concentrated bait spray can be applied most effectively with blower equipment capable of putting out a fine mist spray or with a high-pressure power sprayer. The dilute spray may be applied with any conventional spray equipment. Both types can be applied with a knapsack sprayer. The dilute spray will be most useful where the insecticide must be applied evenly to avoid excessive residues on the fruit, or where larger gallonage is needed to insure reasonably good distribution on large trees.

Complete coverage of all host plants is not necessary, but there should be good distribution throughout the area to be protected, and adjacent ornamental trees and other vegetation such as those growing in border plantings and along fence rows should be sprayed.

Bait-spray deposits on foliage are much more attractive to the flies than are deposits on the trunks and limbs of trees, or on the fruits. Usually they attract twice as many females as males. Females ready to lay eggs respond to the bait as well as those sexually immature.

Attractants

Either partially hydrolyzed yeast protein or enzymatic yeast hydrolysate may be used as the attractant. The latter is fully soluble in water. The partially hydrolyzed yeast protein is partly soluble but is a granular product that is easy to handle. In order to dissolve or disperse either attractant in the spray mixture without danger of clogging the pump, stir the quantity needed into a bucket partially filled with water until all lumps have disappeared and then pour it back into the tank through a strainer, either before or after adding the malathion. Since both materials absorb moisture, they must be kept as dry as possible while in storage.

A low-cost hydrolyzed corn protein called Sauce Base No. 2 has shown promise as an attractant when used at twice the concentration suggested for the other two materials. Because of its high salt content and the possibility of a phytotoxic effect from repeated applications, additional testing is needed before it can be recommended.

Their inclusion as an attractant in a bait spray is a new use for these protein hydrolysates. As far as is known the following are the only manufacturers[1] at present, and the materials are obtainable only from them directly. Other materials may be found that are equally effective.

Partially hydrolyzed yeast protein -- Marvin R. Thompson Co.,
Stamford, Conn.
Enzymatic yeast hydrolysate -- Nutritional Biochemical Corp.,
Cleveland, Ohio
Sauce Base No. 2 -- A. E. Staley Manufacturing Co., Decatur, Ill.

Growers in Hawaii who wish to buy through local dealers should allow ample time for procurement from the mainland.

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[1] Mention of these manufacturers does not constitute endorsement of their products by the Department of Agriculture.

Precautions

Malathion is less poisonous to man and animals than some other insecticides. It has been employed extensively for controlling agricultural pests in concentrations much higher than recommended for this bait spray. However, it may cause trouble if it gets into the eyes, or is swallowed, inhaled, or absorbed through the skin. Take special care when working with concentrated powders or sprays. Observe the precautions on the manufacturer's label.

Do not pick treated fruit for 48 hours after it is sprayed. The fruit should be washed thoroughly or peeled before use. If the spray is applied to very small fruits--smaller than passion fruits or guavas--the interval between spraying and picking should be lengthened to 7 days.

These bait sprays were developed at the Hawaiian laboratory of the Entomology Research Branch. Research conducted by the University of California Agricultural Experiment Station provided basic information on the importance of protein hydrolysates to the oriental fruit fly diet. The Hawaii Agricultural Experiment Station, the Territorial Board of Agriculture and Forestry, the Hawaiian Sugar Planters' Association Experiment Station, and the Pineapple Research Institute extended facilities of much value in the conduct of this research.

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